

REMARKS

Claims 1,2,6, and 7 are pending in the application. Claims 1 and 7 are amended by this response. The support for the claim amendments is as follows: Claims 1 and 7: (Specification p. 12, l. 25). No new matter is added.

Claim Objections

Claim 1 was objected to for the phrase “as an etching gas” and the compound “1,1,1,3,4,4,5,5-nonafluoro-2-pentene” which have been amended by this response.

Claim 7 was objected to for the compound “1,1,1,3,4,4,5,5-nonafluoro-2-pentene” which has been amended by this response.

Claims 1, 2, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (U.S. Patent No. 6,270,948) in view of Igumnov et al. (U.S. Patent No. 6,664,431). (Office Action p. 3)

The Office Action cites to Sato et al. for disclosing a plasma etching process with the step of etching a substrate through a photoresist pattern. (Sato et al., Abstract) The photoresist film of Sato et al. is irradiated with a radiation having a wavelength of that of a mercury lamp, excimer lasers between approximately 350nm to 150nm, X-rays, electron beams, or ion beams. (Sato et al., col. 72, l. 22-30)

The Office Action alleges that Sato et al. disclose a “plasma etching process including the step of etching a substrate through a photoresist pattern, wherein the photoresist film (col. 72, l. 6-18) is irradiated with a radiation having a wavelength of 195nm to form a resist pattern of about 180nm width (col. 72, l. 22-30 and l. 41-49).” (Office Action p. 3) Applicants disagree. A review of the provided citations in Sato et al. did not result in a finding of a resist pattern of about 180nm width measurement. Further, the Office Action concedes Sato et al. “fail to teach the fluorine-containing compound having at least one perfluoro-2-pentyne or 1,1,1,3,4,4,5,5,5 nonafluoro-2-pentene as an etching gas.” (Office Action p. 4, text lines 1-3)

The Office Action relies on Igumnov et al. to compensate for Sato et al. Igumnov et al. do not anticipate the claimed invention. Igumnov et al. do not disclose a dry etching method for forming a resist film with a resist pattern having a minimum line width of not more than 200nm as in the claimed invention. Instead Igumnov et al disclose a process for producing fluorinated aliphatic compounds that are fluorinated olefins and perfluoroalkylvinyl ethers, by pyrolysis of perfluoro- and polyfluorocarboxylic acids, their halides and esters.

In contrast to the references, the specification discloses at pages 2-3 a study of the high molecular weight compounds having an alicyclic structure and alkali-soluble methacrylic acid copolymers for the formation of a resist for radiation with a wavelength of 195 nm or less such as ArF and X-rays and the low etching selectivity for silicon oxide. The claimed invention is capable of forming a resist film from a high molecular weight compound containing 0% -10% by weight of repeating units having an aromatic ring structure exposed to a method of dry etching with a wavelength of **not more than 195nm** and a desired resist pattern having a minimum line width of **not more than 200nm can be formed**. (Specification, p. 5, l. 6-18)

Nevertheless, without acquiescing in any way to the rejection and in order to expedite prosecution and facilitate allowance of the application, by this response, claims 1 and 7 have been amended to remove perfluoro-2-pentene. The remaining gases of the claimed invention are nowhere taught, suggested, or disclosed by the cited references, alone or in combination. Therefore, claims 1 and 7 are chemically distinct and unobvious in light of Sato et al. in view of Igumnov et al.

The cited references do not disclose, teach or suggest the gases of Claims 1 and 7, as presently amended. Therefore, it is respectfully submitted that Sato et al. and Igumnov et al. cannot possibly teach or suggest each and every limitation of claims 1, 2, and 7. For the forgoing reasons, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of Igumnov et al. as applied to claims 1, 2, and 7 above, and further in view of Collins et al. (U.S. Patent 5,556,501). (Office Action p. 4)

As stated in the Office Action at p. 4, Sato et al. do not disclose the plasma density. The Examiner cites Collins et al. to compensate for this deficiency

Collins et al. disclose a domed plasma reactor chamber that uses an antenna driven by RF energy which is inductively coupled inside the reactor dome to generate a high density, low energy plasma inside the chamber for etching metals, dielectrics, and semiconductor materials. (Collins et al., Abstract) The disclosed density of the plasma is $1-2 \times 10^{12}/\text{cm}^3$. (col.24, line 50)

Collins does not disclose, teach or suggest the deficiencies of Sato and Igumnov and does not disclose an etching gas perfluoro-2-pentyne, or at least one kind of fluoropentene selected from 1,1,1,2,4,4,5,5,5-nonafluoro-2-pentene and 1,1,1,3,4,4,5,5,5-nonafluoro-2-pentene.

Claim 6 depends from amended Claim 1 and thus includes all of the elements of Claim 1, as presently amended. Therefore, it is respectfully submitted that Sato et al., Igumnov et al., and Collins et al. do not teach or suggest each and every limitation of claims 1 and 6. For the forgoing reasons, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: May 12, 2008

Respectfully submitted,

By 

James E. Armstrong, IV

Registration No.: 42,266

EDWARDS ANGELL PALMER & DODGE
LLP

P.O. Box 55874

Boston, Massachusetts 02205

(202) 478-7375

Attorneys/Agents For Applicant